CHAPTER 1

INTRODUCTION

1.1 Introduction

Overall, this study is focused on the aspects of Fire Safety Management that influences fire safety of high-rise building users. Besides that, this study is also intended to identify methods to improve fire safety of high-rise building users. In this chapter, the basic elements of the study are presented. Basically, this chapter covers the background, problem statement, aims and objectives, and scope of the study. The research methodology involved in conducting this study is also briefly explained. Lastly, a summary of all the chapters in this study are presented.

1.2 Background

Fire can be a useful tool, but it can also be a deadly nightmare. As the old proverb states, it is a good servant but a bad master. Fire has always fascinated and

frightened us. Without fire, civilization would be radically different. In fact, it might not even exist. However, the cost of fires which get out of control is high, and an average of two to three people die in fires each day in the United Kingdom. Furthermore, according to the High Rise Fire Safety report in the city of Phoenix, every year there are about 7000 fire outbreaks in high-rise office buildings.

Some of the most notable fires recorded in history dated back to as early as the year 1136. The towns of London, Bath and York suffered severe fire damage. The Great Fire of London in 1666 destroyed four-fifths of the city before finally being brought under control. In more recent times, the First Interstate Tower fire on the 4th of May, 1988 in Los Angeles resulted in the death of a building engineer and smoke inhalation by many of the 40 people inside the building at the time of the fire. In addition to this, the fire outbreak in The One Meridian Plaza on the 23rd of February, 1991 in Philadelphia resulted in the death of three fire fighters due to smoke inhalation and destroyed eight floors of this 38-storey high-rise building. Thus, it can be seen how important it is to have proper fire safety management to prevent history from repeating itself.

Human interest in fire safety probably dated back from the discovery and employment of fire. Primitive man used heat for cooking, warming and lighting his dwelling with the inherent risk that misuse or accident in his control of fuel might precipitate disaster. The obvious benefits of numerous friendly uses of heat energy are often overshadowed by the enormous destructive power of fires. Today, as in primitive society, that risk has not been eliminated despite the apparent sophistication of modern living. With the development of habitations, attitudes towards fire safety have also developed. There is continuous interest in understanding the causes of such perils and in devising means of their elimination or reduction.

The threat of fire is always present in high-rise commercial office buildings and can be particularly dangerous to building occupants. As stated by The Merritt Company (1991), "The most critical exposures in high-rise structures include fire, explosion, and contamination of life-support systems such as the air and potable water supply. These threats can be actuated accidentally or intentionally and can quickly develop into catastrophic proportions because of the rapid propagation of fire, smoke and contaminants". Despite the fact that fires are rare occurrences (Kruse, 1993), everyone working in a high-rise building must be ready to act quickly in the event of an occurrence. This is due to the fact that in a fire emergency, the first three to four minutes are crucial. The timely handling of a fire emergency, according to sound procedures established well before the incident ever occurs, can prevent the emergency from becoming a catastrophe.

In conclusion, fire is a potentially life altering threat in any high-rise building and can create an even worse situation if there is no prior preparation for such an event. By conforming to the codes and requirements from the authorities, following sensible preventive actions and adequately training building occupants, security personnel and facility staff in proper response to fire emergencies, the overall threat of fire and fire related damages can be greatly reduced.

1.3 Problem Statement

Quite often if not always, it is the occupants for no fault of their own who fall victim to fire. Besides damage to their belongings and property, some occupants are burned to death for not knowing what to do in the event of fire. The tragedy cannot be compensated in monetary terms. Therefore, it is essential that the occupants of high-

rise buildings educate themselves as to what are the necessary and compulsory measures to be taken in case of fire. It is also the duty and legal responsibility of the owners of high-rise buildings to provide safety measures to their occupants against fire hazard. Irregularities or negligence on their part would lead to prosecution and liability to pay compensation for the damage caused.

Even though high-rise buildings are provided with the most sophisticated fire safety features, assurance of safety to building occupants is questionable and held in doubt. More often than not, fire outbreaks occur as a result of "human factors", such as carelessness, negligence or simply a lack of fire safety awareness. Jelani Abdullah (2001) cited fire incidents to three high-rise buildings in the city of Kuala Lumpur as clear examples of this regard. As mentioned by Tan and Hiew (2004), all parties, being owners, tenants, occupants, cleaners, and security, maintenance and operations personnel are equally responsible for the safety and security in any high-rise building. In response to this, fire safety management has become an integral aspect in the daily operations of high-rise buildings.

As such, this research attempts to identify and establish the most critical aspects of fire safety management that influences fire safety of high-rise building users and subsequently, identify methods to improve fire safety of high-rise building users.

1.4 Aim and Objectives of the Study

The aim of this study is to investigate the pertinent aspects of Fire Safety Management in high-rise buildings and to identify methods to improve fire safety of

high-rise building users. To achieve this aim, three objectives have been delineated as follows:

- To identify the attributes of Fire Safety Management that influences fire safety of high-rise building users;
- To establish the critical attributes of Fire Safety Management that influences fire safety of high-rise building users and;
- To identify methods to improve fire safety of high-rise building users.

1.5 Scope of the Study

The scope of this study has to be narrowed down or focused to simplify the process of information gathering in order to conduct the analysis within an appropriate time frame. The scope of the study is limited to:

- Only high-rise buildings;
- Two building case studies only, being the Petronas Twin Towers and KL Tower; and
- The aspects of Fire Safety Management in high-rise buildings only.

1.6 Research Methodology

The research will be conducted in several stages to achieve all of the objectives of this study. The first stage would involve identifying the objectives and scope of

work involved. Once finalized, the second stage would be to conduct the literature review to find out more information about fire hazards and fire safety in general, thus achieving part of the first and third objective. This is also to ensure proper understanding of the subject matter and to enhance knowledge level. The third stage would involve conducting the field research from the case study chosen to fully achieve all three objectives. One of the methods that will be used in the field research would be to conduct professional interviews with the personnel involved in the implementation of fire safety management in the chosen case study high-rise buildings. An interview checklist will be prepared prior to conducting the interview to avoid missing out on any essential questions. Besides the professional interviews, a questionnaire survey would also be conducted in fulfillment of the objectives of the study. The questionnaire survey would be based on a Likert's Scale of 1 (Disagree) – 5 (Strongly Agree) and the respondents would be required to give their ratings based on the questions asked. The fourth stage of research would be to compile all the data obtained and conduct the analysis. The last stage would be the presentation of the analyzed data and writing of the report with conclusions and future recommendations. A flowchart of the processes involved is shown in Figure 1.1.

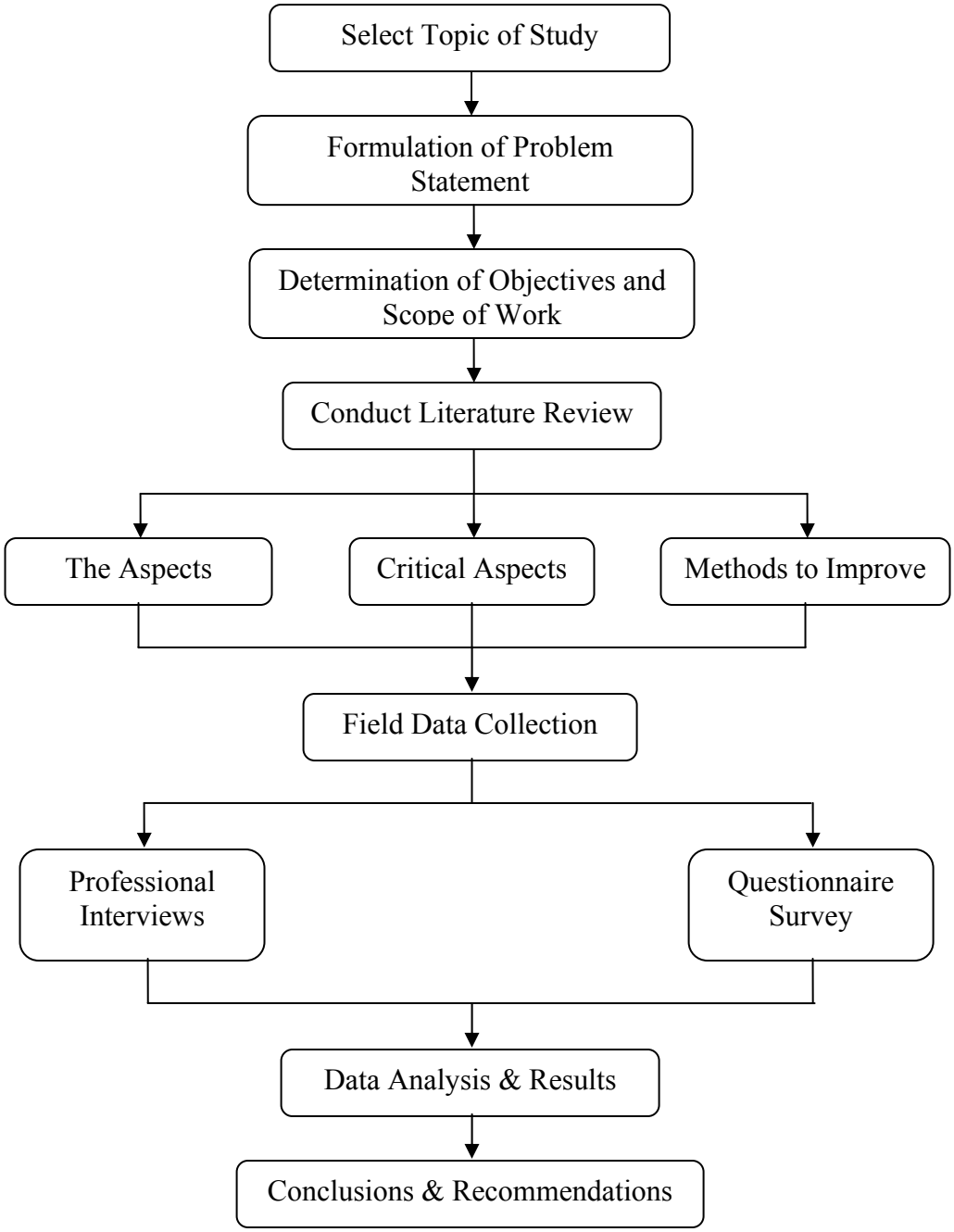

Figure 1.1 : Research Methodology Flow Chart

1.7 Summary of Chapters

This study provides some valuable insights into the aspects of Fire Safety Management that are crucial towards fire safety of high-rise building users. The study consists of seven chapters.

The first chapter is basically an introduction to the research, which includes the problem statement, the aims and objectives of the study, the scope of work involved, and the brief research methodology. Lastly, a summary of all the chapters is also presented.

The second chapter is basically an introduction to high-rise buildings in general. In this chapter, the definition as well as a brief history of high-rise buildings is presented. This chapter also includes a comparison of the fire risk in high-rise buildings against the fire risk in low-rise buildings. Besides that, some fire statistics are also presented in this chapter. Lastly, the laws or regulations that govern fire safety are briefly presented.

The third chapter basically covers the nature of fire. In this chapter, the nature and behavior of fire are discussed in detail. Besides that, the sources of fire hazards in high-rise buildings are also presented. Subsequently, the major causes of fire in high-rise buildings are presented. This is followed by methods or materials that can be used to protect the various types of materials used in construction of high-rise buildings such as wood, steel and reinforced concrete. Lastly, the effects of fire or fire products on people and property are discussed. This chapter also briefly discusses how humans typically tend to behave in the event of fire.

The fourth chapter covers the various aspects of Fire Safety Management in detail. Besides this, several other systems that are commonly used to enhance fire safety in high-rise buildings are also briefly discussed.

The fifth chapter explains the research methodology in detail. The research methodology for this study is divided into several stages. The first stage is the determination of the objectives and scope of work involved. Once this is completed, the literature review is conducted to gain a better understanding and broaden knowledge with respect to the subject matter. Next, professional interviews are conducted with the relevant people involved in the daily operations of high-rise buildings to obtain their opinions and feedback. Based on the literature review and information from the interviews, the questionnaire can be developed. Subsequently, field data collection is conducted to obtain the necessary data. Once obtained, the data is analyzed and the inferences are derived. Lastly, the discussion and conclusion is done to conclude the study.

In the sixth chapter, the data analysis and results obtained are discussed in detail. Statistics are used to analyze the background of the respondents and a Likert's Scale of five ordinal measures is used to identify the aspects of Fire Safety Management that influences fire safety of high-rise building users, the most critical of these aspects and the methods to improve fire safety of high-rise building users. The inferences are then made based on the results of the analysis.

Lastly, the seventh chapter highlights the conclusions made from the study and the recommendations for further studies.